

WHAT IS CLAIMED IS:

1. A semiconductor device with a high breakdown voltage, comprising:

a semiconductor substrate of a first conductivity type;

a semiconductor region of a second conductivity type, which is defined in the substrate;

a drain region of the second conductivity type, which is defined approximately at the center of the semiconductor region;

a body region of the first conductivity type, which is defined in the semiconductor region so as to be spaced apart from, and to surround, the drain region;

a source region of the second conductivity type, which is defined in the body region;

a gate insulating film deposited over the body region;

a gate electrode formed on the gate insulating film;

a field insulating film deposited over a part of the semiconductor region, the part being located between the body and drain regions;

a metal electrode electrically connected to the drain region;

a plurality of electrically floating plate electrodes, which are spaced apart from, and surround, the drain region when the device is viewed from over the substrate; and

an interlevel dielectric film formed over the gate insu-

lating film and the field insulating film and under the plate electrodes,

wherein parts of the metal electrode are extended onto the interlevel dielectric film and are located over the plate electrodes, and

wherein each said part of the metal electrode is capacitively coupled to an associated one of the plate electrodes.

2. The device of Claim 1, wherein when the device is viewed from over the substrate, the drain region is approximately circular, while the body and source regions are in the shape of rings that form concentric circles around the drain region.

3. The device of Claim 1, wherein when the device is viewed from over the substrate, the drain region is approximately circular, while the plate electrodes are in the shape of rings that form concentric circles around the drain region, and

wherein the metal electrode includes, as the extended parts, a plurality of annular metal electrodes that are formed over the plate electrodes with the interlevel dielectric film interposed therebetween, each said annular metal electrode being electrically connected to the drain region.

4. The device of Claim 3, wherein at least one of the annular metal electrodes is smaller in width than an associated one of the plate electrodes that is capacitively coupled to the annular metal electrode.

5. The device of Claim 3, wherein the metal electrode comprises a part that overlaps the entire upper surface of one of the plate electrodes, which is located closer to the drain region than any other one of the plate electrodes is, with the interlevel dielectric film interposed therebetween.

6. The device of Claim 3, wherein the more distant from the drain region each said annular metal electrode is, the smaller the width of the annular metal electrode is.

7. The device of Claim 1, wherein a plurality of girdling regions of the first conductivity type are defined in respective upper parts of the semiconductor region that are located under the plate electrodes.

8. The device of claim 3, wherein a plurality of girdling regions of the first conductivity type are defined in respective upper parts of the semiconductor region that are located under the plate electrodes, and

wherein the girdling regions are in the shape of rings

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that form concentric circles around the drain region.

9. The device of Claim 1, further comprising an isolating region of the first conductivity type that surrounds the semiconductor region,

wherein the semiconductor region is electrically isolated using a junction formed between the semiconductor and isolating regions.

10. The device of Claim 1, further comprising an isolating insulating film that surrounds the semiconductor region,

wherein the semiconductor region is electrically isolated using the insulating film.

11. The device of Claim 1, further comprising an insulating layer formed on the substrate of the first conductivity type,

wherein the semiconductor region of the second conductivity type is defined on the insulating layer.

12. The device of Claim 1, further comprising:
a protective coating formed over the metal electrode and
the interlevel dielectric film; and
a plastic encapsulant formed on the protective coating.